

What is claimed is:

1. A method of manufacturing a microlens substrate,
comprising the steps of:

5 forming a laminar first microlens array on a
transparent substrate;

forming an intermediate layer and a photosensitive
resin layer in this order on the first microlens array;

exposing the photosensitive resin layer via the first
microlens array and the intermediate layer;

10 developing the exposed photosensitive resin layer to
form a pattern for forming a second microlens array;

forming recesses for forming the second microlens
array in the intermediate layer by performing etching until
the pattern is removed; and

15 forming the second microlens array by burying the
recesses with a resin, wherein

the exposure step involves: emitting lights having a
uniform intensity from a light source; imaging the emitted
lights on a focal surface of the first microlens array located
20 on the photosensitive layer; and exposing the photosensitive
resin layer by changing an exposure duration according to a
focal position of the first microlens array.

2. The method according to claim 1, wherein
25 the light source is a linear light source.

3. The method according to claim 2, wherein
the exposure step is conducted by changing a position
of the linear light source.

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4. The method according to claim 2, wherein
the exposure step is conducted by fixing a position of
the linear light source and rotating the transparent
substrate which is rotatably arranged so as to be inclined
10 relative to the lights emitted from the linear light source,
said transparent substrate having the first microlens array,
the intermediate layer and the photosensitive resin layer on
it.

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5. The method according to claim 1, wherein
the light source is a rectangular surface light source
having a variable emission area.

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6. The method according to claim 5, wherein
the emission area of the surface light source is varied
by changing an opening width of an aperture having a
rectangular opening formed in the surface light source.

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7. A microlens exposure optical system used for
manufacturing a microlens substrate having a first

microlens array, an intermediate layer and a second microlens array laminated in this order on a transparent substrate, the microlens exposure optical system comprising:

5 a linear light source emitting lights having a uniform intensity;

 a collimator lens collimating the lights emitted from the linear light source; and

 the transparent substrate having a photosensitive
10 resin layer formed on the intermediate layer, the lights passed through the collimator lens being imaged on the photosensitive resin layer via the first microlens array and the intermediate layer.

15 8. The microlens exposure optical system according to claim 7, wherein

 a position of the linear light source is variable.

 9. The microlens exposure optical system according
20 to claim 7, wherein

 the transparent substrate is rotatably arranged so that a tilt angle formed between a normal of the transparent substrate and an optical axis of each light is variable.

25 10. The microlens exposure optical system according

to any one of claims 7 to 9, further comprising:

a narrow band-pass optical filter inserted into an optical path of the lights emitted from the linear light source.

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11. A microlens exposure optical system used for manufacturing a microlens substrate having a first microlens array, an intermediate layer and a second microlens array laminated in this order on a transparent substrate, the microlens exposure optical system comprising:

a rectangular surface light source emitting lights having a uniform intensity, and having a variable emission area;

15 a collimator lens collimating the lights emitted from the surface light source; and

the transparent substrate having a photosensitive resin layer formed on the intermediate layer, the lights passed through the collimator lens being imaged on the photosensitive resin layer via the first microlens array and the intermediate layer.

12. The microlens exposure optical system according to claim 11, further comprising:

25 a narrow band-pass optical filter inserted into an

optical path of the lights emitted from the surface light source.